Course Name: **Honors PreCalculus**

Summer Assignment:

This packet includes material your teacher expects you to know when you begin the course. It is designed to be done over the course of the summer to provide practice and highlight the concepts you learned in your previous math course.

Instructions:

- Complete the packet on loose leaf paper.
- Write your name and the course on the top of every sheet you use.
- Number your work, and do the problems in order.
- Copy each problem before showing your work.
- Check your answers as you go (answers are included at the end of the packet).

The completed assignment is due on the first day of class and is worth *25 points*.

Honors PreCalculus Summer Assignment

Please print this assignment and complete all problems on loose leaf paper to be turned in on the first day of class. This will count as your first homework assignment. Completion of each problem is expected. The answers are given, so work must be shown in order to receive full credit. The assignment is a review of your algebra and right triangle trig so that you can be successful in the coming school year. All work should be neat and completed in pencil only. You may use the internet, old notebooks and other materials for help.

You will need a 3 subject notebook for math only and a T1 84 plus CE calculator is preferred.

Name: _____

Date: _____

Please work on a separate sheet of paper and ALWAYS show ALL work to support your answer!!

Part 1: Prerequisite Skills -- Exponent Rules, The Quadratic Formula and Factoring

Simplify using exponent rules. Assume that no variable equals zero. Write all exponents as POSITIVE.

1. $\dfrac{x^{-2}y}{x^4 y^{-1}}$

2. $\dfrac{12m^8 y^6}{-9my^4}$

3. $\left(4a^3 c^2\right)^3 \left(-3ac^4\right)^2$

4. $\left(\dfrac{5a^7}{2b^5 c}\right)^3$

5. $\left(\dfrac{7m^{-1}n^3}{m^{-1}n^2}\right)^{-1}$

6. $\dfrac{\left(3x^{-2}y^3\right)\left(5xy^{-8}\right)}{\left(x^3\right)^4 \cdot y^{-2}}$

Solve each equation :

1. $2x^2 - 5x + 3 = 0$

2. $2x^2 - x - 13 = 2$

3. $2x^2 - x - 4 = 2$

4. $8x^2 - 4x = 18$

5. $10x^2 + 9 = x$

6. $x^2 = 9x - 20$

7. $9x^2 - 11 = 6x$

8. $4x^2 - 8 = x$

9. $14x^2 + 1 = 6x^2 + 7x$

10. $4x^2 + 4x - 8 = 1$

Solve each equation

11. $(3n - 2)(4n + 1) = 0$

12. $m^2 - 3m = 0$

13. $(5n - 1)(n + 1) = 0$

14. $(n + 2)(2n + 5) = 0$

15. $3k^2 + 72 = 33k$

16. $n^2 = -18 - 9n$

17. $7v^2 - 42 = -35v$

18. $k^2 = -4k - 4$

19. $-2v^2 - v + 12 = -3v^2 + 6v$

20. $-4n^2 = 6n + 16 - 5n^2$

21. $8r^2 + 3r + 2 = 7r^2$

22. $b^2 + b = 2$

23. $10n^2 - 35 = 65n$

24. $3x^2 - 8x = 16$

25. $16n^2 - 114x = -14$

26. $28n^2 = -96 - 184n$

27. $7a^2 + 32 = 7 - 40a$

28. $42x^2 - 69x + 20 = 7x^2 - 8$

Part 2: Domain, Functions and Inverses

Find the domain of each function.

1. $h(x) = 4x - 3$

2. $g(x) = 18 - 5x$

3. $f(x) = \dfrac{2x}{x-3}$

4. $f(x) = \dfrac{x+5}{x+4}$

5. $g(x) = \dfrac{x+3}{x(x+2)}$

6. $h(x) = \dfrac{x-2}{x^2 - 16x + 60}$

7. $g(x) = \dfrac{4}{x^2 - 4}$

8. $f(x) = \sqrt{x-2}$

9. $h(x) = \dfrac{3x}{\sqrt{x-5}}$

10. $f(x) = \dfrac{5}{|x+3|}$

11. $g(x) = \dfrac{x+1}{x^2 + 4x}$

12. $h(x) = \dfrac{x+2}{\sqrt{9-x^2}}$

13. $j(x) = \dfrac{x}{|x-10|}$

14. $f(x) = \dfrac{\sqrt{8-x}}{x}$

Perform the operations listed on the given functions.

15. Find $(f+g)(x)$, $(f-g)(x)$, $(f \cdot g)(x)$, and $\left(\dfrac{f}{g}\right)(x)$, given the following:

    a. $f(x) = \dfrac{1}{x}$ and $g(x) = 7 - x$

    b. $f(x) = \dfrac{1}{2-3x}$ and $g(x) = \dfrac{2}{3x-2}$

    c. $f(x) = \dfrac{3x+5}{2}$ and $g(x) = \dfrac{2x-5}{3}$

Find $[f \circ g](x)$ for each $f(x)$ and $g(x)$. Also state the domain of the composition.

16. $f(x) = x^2$ and $g(x) = \dfrac{1}{x^3}$

17. $f(x) = \dfrac{x-1}{x-2}$ and $g(x) = \dfrac{x-3}{x-4}$

18. $f(x) = \dfrac{x}{x-2}$ and $g(x) = \dfrac{3}{x}$

19. $f(x) = x^2 - 16$ and $g(x) = \sqrt{x}$

Inverses: Find the inverse of each function.

20. $f(x) = x^3$

21. $h(x) = \dfrac{1}{x}$

22. $w(x) = 2x + 1$

23. $g(x) = x^2 + 1$, for $x \geq 0$

24. $r(x) = \sqrt[5]{2x + 1}$

Showing Inverses by Composition: For each problem, find $f(g(x))$ and $g(f(x))$. Then determine whether f and g are inverses.

25. $f(x) = x^2$, $g(x) = \sqrt{x}$

26. $f(x) = x^3$, $g(x) = \sqrt[3]{x}$

27. $f(x) = \dfrac{1}{x} + 2$, $g(x) = \dfrac{1}{x - 2}$

28. $f(x) = 2x + 1$, $g(x) = \dfrac{x}{2} - 1$.

Part 3: Logarithmic Functions

Evaluate each expression. Work on a separate sheet of paper. Make sure to show the exponential equation. Leave your answer in simplest fraction form, if necessary.

1. $\log_5 1$

2. $\log_4 \dfrac{1}{16}$

3. $\log_{\frac{1}{25}} 5$

4. $\log_9 27$

5. $\log_4 128$

6. $\log_{27} \dfrac{1}{3}$

Solve each equation. Work on a separate sheet of paper. Show all work. Leave your answer in simplest fraction form, if necessary.

7. $\log_9 x = \dfrac{3}{2}$

8. $\log_4 x = -\dfrac{3}{2}$

9. $\log_{10} x^2 = -4$

10. $\log_3 (x+2) = 5$

11. $\log_6 (2x-1) = 3$

12. $\log_4 (2x) = -\dfrac{1}{2}$

13. $\log_8 (x-5) = \dfrac{2}{3}$

Solve each equation. Work on a separate sheet of paper. Show all work. Leave you answer in simplest fraction form, if necessary. Important: When no base is shown, the base is 10.

14. $\log_6 (2x-3) = \log_6 12 - \log_6 3$

15. $\log(x+2) - \log x = 2\log 4$

16. $3\log_2 x - 2\log_2 (5x) = 2$

17. $2\log_4 (x+1) = \log_4 (11-x)$

18. $\log x + \log(3x-5) = \log 2$

19. $\log(-4-x) + \log 3 = \log(2-x)$

20. $\log x - \log(x+6) = \dfrac{1}{2}\log 9$

21. $\log_2 (x+7) + \log_2 x = 3$

22. $\log_3 (x+3) + \log_3 (x+5) = 1$

23. $\log(x+3) = 1 + \log(x-2)$

24. $\log(57x) = 2 + \log(x-2)$

25. $\log_5 (x+3) - \log_5 (2x-1) = 2$

26. $\log_2 (5y+2) - 1 = \log_2 (1-2y)$

27. $\log(c^2 - 1) - 2 = \log(c+1)$

28. $\log_7 x + 2\log_7 x - \log_7 3 = \log_7 72$

29. $\log_{16} (9x+5) - \log_{16} (x^2 - 1) = \dfrac{1}{2}$
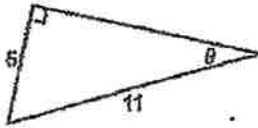
30. $3\log_5 (x^2 + 9) - 6 = 0$

Part 4: Trigonometry

Right Triangle Trigonometry: Find the values of sine, cosine and tangent of for θ. Write your answer in simplest fraction and/or radical form (rationalize your denominator!!)
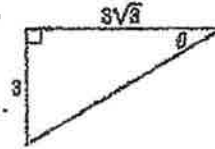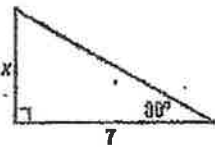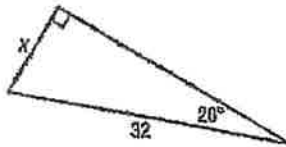
1.

2.

3. $3\sqrt{3}$

Write an equation involving sine, cosine or tangent that can be used to find x. Then solve the equation. Round measures of sides to the nearest tenth and measures of angles to the nearest degree.
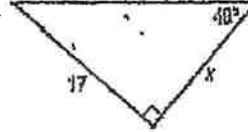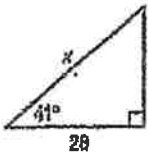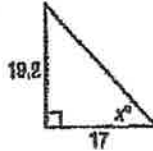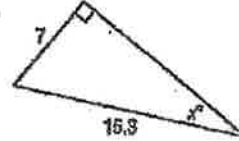
4.

5.

6.

7.

8.

9.

Solve for all missing parts of triangle ABC using the given measurements. Round measures of the sides to the nearest tenth and measures of the angles to the nearest degree.
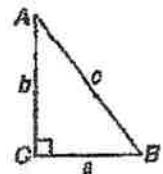
10. $A = 35°, a = 12$

11. $B = 71°, b = 25$

12. $B = 36°, c = 8$

13. $a = 4, b = 7$

14. $A = 17°, c = 3.2$

15. $b = 52, c = 95$

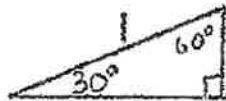Complete the sides of the special right triangles

16.

17.

18.

Summer Assignment Solutions

Exponent Rules:

1. $\dfrac{y^2}{x^6}$

2. $-\dfrac{4m^7 y^2}{3}$

3. $576 a^{11} c^{14}$

4. $\dfrac{125 a^{21}}{8 b^{15} c^3}$

5. $\dfrac{1}{7n}$

6. $\dfrac{15}{x^{13} y^3}$

Quadratic Formula and Factoring:

1. $x = 1.5, x = 1$

2. $x = 3, x = -2.5$

3. $x = 2, x = -1.5$

4. $x = \dfrac{1 \pm \sqrt{37}}{4}$

5. $x = \dfrac{1 \pm i\sqrt{359}}{20}$

6. $x = 5, x = 4$

7. $x = \dfrac{1 \pm 2\sqrt{3}}{3}$

8. $x = \dfrac{1 \pm \sqrt{129}}{8}$

9. $x = \dfrac{7 \pm \sqrt{17}}{16}$

10. $x = \dfrac{-1 \pm \sqrt{10}}{2}$

11. $n = \dfrac{2}{3}, n = -\dfrac{1}{4}$

12. $m = 0, m = 3$

13. $n = \dfrac{1}{5}, n = -1$

14. $n = -2, n = -\dfrac{5}{2}$

15. $k = 8, k = 3$

16. $n = -6, n = -3$

17. $v = -6, v = 1$

18. $k = -2,$ *(double root)*

19. $v = 3, v = 4$

20. $n = 8, n = -2$

21. $r = -1, r = -2$

22. $b = -2, b = 1$

23. $n = -0.5, n = 7$

24. $x = -\dfrac{4}{3}, x = 4$

25. $n = 7, n = \dfrac{1}{8}$

26. $n = -\dfrac{4}{7}, n = -6$

27. $a = -\dfrac{5}{7}, a = -5$

28. $x = \dfrac{4}{7}, x = \dfrac{7}{5}$

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1. all reals

2. all reals

3. all reals, $x \neq 3$

4. all reals, $x \neq -4$

5. all reals, $t \neq 0, t \neq -2$

6. all reals, $x \neq 6, x \neq 10$

7. all reals, $x \neq \pm 2$

8. $x \geq 2$

9. $x > 5$

10. all reals, $x \neq 3$

11. all reals $, x \neq 0, x \neq -4$

12. $-3 < x < 3$

13. all reals $, x \neq 10$

14. $x \leq 8, x \neq 0$

15. a. $(f+g)(x) = \dfrac{1+7x-x^2}{x}$, $(f-g)(x) = \dfrac{1-7x+x^2}{x}$, $(f \cdot g)(x) = \dfrac{7-x}{x}$,

$(f \div g)(x) = \dfrac{1}{x(7-x)}$

b. $(f+g)(x) = \dfrac{1}{3x-2}$, $(f-g)(x) = \dfrac{9x-6}{(2-3x)(3x-2)}$,

$(f \cdot g)(x) = \dfrac{2}{(2-3x)(3x-2)}$, $(f \div g)(x) = \dfrac{3x-2}{4-6x}$

c. $(f+g)(x) = \dfrac{13x+5}{6}$, $(f-g)(x) = \dfrac{5x+25}{6}$, $(f \cdot g)(x) = \dfrac{6x^2-5x-25}{6}$,

$(f \div g)(x) = \dfrac{9x+15}{4x-10}$

16. $(f \circ g)(x) = \dfrac{1}{x^6}$, D: all reals, $x \neq 0$

17. $(f \circ g)(x) = \dfrac{1}{5-x}$, D: all reals, $x \neq 4, x \neq 5$

18. $(f \circ g)(x) = \dfrac{3}{3-2x}$, D: all reals, $x \neq 0, x \neq \dfrac{3}{2}$

19. $(f \circ g)(x) = x-16$, D: all reals, $x \geq 0$

20. $f^{-1}(x) = \sqrt[3]{x}$

21. $h^{-1}(x) = \dfrac{1}{x}$

22. $w^{-1}(x) = \dfrac{x-1}{2}$

23. $g^{-1}(x) = \sqrt{x-1}$

24. $r^{-1}(x) = \dfrac{x^5-1}{2}$

25. Yes

26. Yes

27. Yes

28. No

Part 3: Logarithmic Functions

1. 0

2. -2

3. -0.5

4. 1.5

5. $\dfrac{7}{2}$

6. $-\dfrac{1}{3}$

7. $x = 27$

8. $x = \dfrac{1}{8}$

9. $x = \dfrac{1}{100}$

10. $x = 241$

11. $x = 108.5$

12. $x = 0.25$

13. $x = 9$

14. $x = \dfrac{7}{2}$

15. $x = \dfrac{2}{15}$

16. $x = 100$

17. $x = 2$

18. $x = 2$

19. $x = -7$

20. no solution

21. $x = 1$

22. $x = -2$

23. $x = \dfrac{23}{9}$

24. $x = \dfrac{200}{43}$

25. $x = \dfrac{4}{7}$

26. $x = 0$

27. $x = 101$

28. $x = 6$

29. $x = 3$

30. $x = -4, x = 4$

Part 4: Trigonometry, Law of Sines, and Law of Cosines

1. $\sin\theta = \dfrac{15}{17}$

   $\cos\theta = \dfrac{8}{17}$

   $\tan\theta = \dfrac{15}{8}$

** *I will introduce the other 3 trig ratios in class!! For now, just focus on sine, cosine and tangent!!*

2. $\sin\theta = \dfrac{5}{11}$

   $\cos\theta = \dfrac{4\sqrt{6}}{11}$

   $\tan\theta = \dfrac{5\sqrt{6}}{24}$

3. $\sin\theta = \dfrac{1}{2}$

   $\cos\theta = \dfrac{\sqrt{3}}{2}$

   $\tan\theta = \dfrac{\sqrt{3}}{3}$

4. $x = 4$

5. $x = 10.9$

6. $x = 14.8$

7. $x = 37.1°$

8. $x = 48°$

9. $x = 27°$

10. $B = 55°, b = 17.1, c = 20.9$

11. $A = 19°, a = 8.5, c = 26.4$

12. $A = 54°, a = 6.5, b = 4.7$

13. $B = 60°, c = 8.1, A = 30°$

14. $B = 73°, b = 3.1, a = 0.9$

15. $a = 79.5, B = 33°, A = 57°$

16. $\dfrac{\sqrt{3}}{2}, \dfrac{\sqrt{2}}{2}, 1$

17. $\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, 1$

18. $\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, 1$